## **CLAIMS**

## What is claimed is:

- 1 1. A method for forming a magnetic head having an improved PtMn layer,
- 2 comprising:
- 3 forming a PtMn layer using ion beam deposition;
- forming an antiparallel (AP) pinned layer structure above the PtMn layer; and
- forming a free layer above the AP pinned layer structure.
- 1 2. A method as recited in claim 1, wherein the AP pinned layer structure includes at
- 2 least two pinned layers having magnetic moments that are antiparallel to each
- other, the pinned layers being separated by an AP coupling layer.
- 1 3. A method as recited in claim 1, wherein a dR of the head is at least 2% greater
- 2 than a dR of a substantially similar head having a PtMn layer formed by plasma
- 3 vapor deposition.
- 1 4. A method as recited in claim 1, wherein a dR of the head is at least 4% greater
- than a dR of a substantially similar head having a PtMn layer formed by plasma
- 3 vapor deposition.

- 1 5. A method as recited in claim 1, wherein an easy axis coercivity (Hce) of the free 2 layer is at least 5% less than an Hce of a free layer of a substantially similar head
- 3 having a PtMn layer formed by plasma vapor deposition.
- 1 6. A method as recited in claim 1, wherein an easy axis coercivity (Hce) of the free
- 2 layer is at least 10% less than an Hce of a free layer of a substantially similar head
- 3 having a PtMn layer formed by plasma vapor deposition.
- 1 7. A method as recited in claim 1, wherein an easy axis coercivity (Hce) of the free
- 2 layer is at least 15% less than an Hee of a free layer of a substantially similar head
- 3 having a PtMn layer formed by plasma vapor deposition.
- 1 8. A method as recited in claim 1, wherein a hard axis coercivity (Hch) of the free
- 2 layer is at least 10% less than an Hch of a free layer of a substantially similar head
- 3 having a PtMn layer formed by plasma vapor deposition.
- 1 9. A method as recited in claim 1, wherein a hard axis coercivity (Hch) of the free
- 2 layer is at least 15% less than an Hch of a free layer of a substantially similar head
- 3 having a PtMn layer formed by plasma vapor deposition.
- 1 10. A method as recited in claim 1, wherein a hard axis coercivity (Hch) of the free
- 2 layer is at least 20% less than an Hch of a free layer of a substantially similar head
- 3 having a PtMn layer formed by plasma vapor deposition.

A method as recited in claim 1, wherein each of the layers above the PtMn layer 1 11. 2 is formed by plasma vapor deposition. 1 12. A method as recited in claim 1, wherein each of the layers in the head is formed 2 by ion beam deposition. 1 A head formed by the process recited in claim 1. 13. 1 14. A head as recited in claim 13, wherein the head forms part of a GMR head. 1 15. A head as recited in claim 13, wherein the head forms part of a CIP GMR sensor. 1 16. A method for forming a magnetic head having an improved PtMn layer, 2 comprising: 3 forming seed layers; 4 forming a PtMn layer above the seed layers using ion beam deposition; 5 forming an antiparallel (AP) pinned layer structure above the PtMn layer; 6 forming a free layer above the AP pinned layer structure; forming a spacer layer above the free layer; and 7 8 forming a bias layer above the spacer layer.

## HIT1P027/HSJ9-2003-0150US1

A head formed by the process recited in claim 16.

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1	18.	A magnetic storage system, comprising:
2		magnetic media;
3		at least one head for reading from and writing to the magnetic media, each head
4		having:
5		a sensor formed at least in part by the process recited in claim 1;
6		a write element coupled to the sensor;
7		a slider for supporting the head; and
Q		a control unit counled to the head for controlling operation of the head